**EARTH SCIENCES TEST 3 Study Guide:**

1. Igneous rock:
   1. What are the two main types?
   2. How, where, and why do they form?
   3. Characteristic of the two main types – location of formation, grain size, sourced from magma vs lava, mafic vs felsic.
   4. Examples of the two main types.
   5. How do we benefit TODAY from igneous intrusions and volcanoes
   6. Silica rich rocks and semi-precious gems, where are they found? Know a few examples.
   7. Kimberlites – what are they?
   8. What is a Xenolith?
   9. Why are kimberlites super important from a jeweler’s perspective?
   10. Why are kimberlites super important from a geologist’s perspective? What do they tell us about the mantle that regular volcanoes do not tell us?
2. Minerals:
   1. What are three characteristics of a mineral?
   2. What are 5 ways to identify minerals? Be able to both name the test and describe how it works.
   3. Why is streak a more reliable test for mineral identification than color?
   4. Know Mohs hardness number 10, 2.5.
3. Sedimentary Rock:
   1. What are sedimentary rocks?
   2. How are they formed? Know the process order and definition:
      1. Define weathering.
      2. Be able to explain the different types of weathering (chemical (acid rain, oxidation, precipitation), physical - wind water, physical (biological)
      3. Define Erosion – be able to distinguish between erosion by water versus erosion by wind (think grain size, energy of the systems, sorting, how the grains are changed by transport)
      4. What is saltation?
      5. Deposition – why does it occur?
      6. Compaction
         1. Why is compaction necessary?
         2. How does compaction influence porosity?
         3. How does compaction influence permeability?
      7. Cementation
         1. What is the role of cementation in making a sedimentary rock?
         2. What are the two most important natural cements?
      8. What is lithification?
      9. What are the three main classes of sedimentary rock?
      10. What is an organic rock? Example?
      11. What is the difference between a conglomerate and a breccia?
      12. What is the difference between sandstone and a mudstone?
      13. Mass movement – Rock fall vs mudflow
      14. What are turbidites? What can trigger them?
      15. Law of superposition

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| Chemical formula | Common name | Sedimentary Rock | Other info | Metamorphic Rock |
| CaCO3 | Calcite, Calcium Carbonate | Limestone | Can be biological (foraminifera, coral, shells) or crystalline | Marble |
| SiO2 | Silica, Silicon dioxide, Quartz | Quartz Sandstone | Can be biological (diatoms form chert) or crystalline igneous | Quartzite |

1. Metamorphic Rocks:
   1. What are metamorphic rocks?
   2. Be able to describe the three main types of metamorphism: Regional, Contact and Hydrothermal.
   3. Why is the grade of metamorphism related to its distance from the source of heat or pressure?
   4. What is a metamorphic pathway from low to high grade metamorphic rock (Shale, Slate, Phyllite, Schist, Gneiss)
   5. What is foliation? What causes it?
   6. Using examples why are some metamorphic rocks foliated and others not?
   7. At what temperature do rocks begin to chemically change?
   8. Remember heat and pressure also increases as we bury and compact older sediments with younger ones. What is the rate of change as we go deeper into the Earth’s crust?
   9. What is the temperature range at which metamorphism stops?
   10. Why?
   11. Why do hydrothermal vents lead to the accumulation of precious metals? Think about why we dissolved the salt crystals in boiling hot water? Then as it cooled the crystal slowly precipitated out of solution.
   12. Hydrothermal vents spew waters as hot as 400 degrees Celsius. What can they tell us about the evolution of life as our planet cooled and water began to fill our oceans and river basins?